



Osteomyelitis

Bone biopsy before antibiotics · And oral therapy is not second best

ORAL = IV
OVIVA, first 6 weeks

WORK OUT WHICH KIND *the route of infection drives the organism and the surgery*

HEMATOGENOUS

Bloodborne seeding. **Vertebral** in adults — back pain, fever, raised inflammatory markers. **Always look for the source:** think **endocarditis**, line infection, or injection drug use, and get blood cultures and an echo where **S. aureus** is grown.

CONTIGUOUS

Spread from adjacent infection or direct inoculation — trauma, surgery, pressure ulcer. Often **polymicrobial**, and frequently needs **debridement** because devitalised bone will not sterilize with antibiotics alone.

DIABETIC FOOT

Neuropathy plus vascular disease plus ulceration. **Probe-to-bone is a useful bedside test** — a positive probe in a deep ulcer substantially raises the probability. **Assess perfusion**, because an ischemic foot will not heal on antibiotics.

GET THE DIAGNOSIS AND THE ORGANISM *the culture decides months of therapy — get it right*

Step	Detail
MRI	The imaging test of choice — sensitive early, and defines abscess, sequestrum, epidural extension and soft tissue involvement. Plain films are normal for 2–3 weeks , so a normal X-ray excludes nothing early.
Bone biopsy and culture	The reference standard. Obtain before starting antibiotics whenever the patient is stable — the yield falls sharply once treatment starts, and you are committing them to weeks of therapy.
Do not use superficial swabs	Wound and sinus tract swabs correlate poorly with the true bone pathogen and mislead therapy. The exception worth acting on is S. aureus in a sinus tract , which does predict bone infection reasonably well.
Blood cultures	Positive in a substantial minority, especially hematogenous vertebral disease — and a positive blood culture may spare a biopsy entirely.
ESR and CRP	Non-specific for diagnosis but useful for monitoring response . A failure to fall should prompt reassessment for undrained collection, resistant organism, or a need for surgery.

TREAT IT *duration, route, and when the surgeon is essential*

- 1 Target the organism.** MSSA → an anti-staphylococcal beta-lactam such as cefazolin or nafcillin, which **outperform vancomycin**. MRSA → vancomycin or daptomycin. Streptococci → a beta-lactam. **Empirical therapy is for the unstable patient**, not the routine one.
- 2 Duration is typically about 6 weeks** of definitive therapy for most native bone infection, counted from the last debridement or the start of effective therapy.
- 3 Oral is non-inferior to intravenous.** The OVIVA trial randomized over 1,000 patients with bone and joint infection and found oral therapy non-inferior over the **first 6 weeks** — treatment failure **13.2% oral versus 14.6% IV**, with **no difference in serious adverse events** and a **shorter hospital stay** (median 11 versus 14 days).
- 4 Use oral agents with good bone penetration and bioavailability** — typically a fluoroquinolone with or without rifampin, linezolid, or clindamycin, guided by susceptibilities. This avoids a long line and its complications.
- 5 Surgery when antibiotics cannot win: necrotic bone or sequestrum**, abscess, **retained hardware**, spinal instability or cord compression, and failure to respond. **Antibiotics do not penetrate dead bone** — source control is the treatment.

TWO SITUATIONS WITH THEIR OWN RULES *vertebral and prosthetic disease*

VERTEBRAL OSTEOMYELITIS

New back pain with fever and raised inflammatory markers — and pain that is worse at night or at rest. **MRI the whole spine**, since non-contiguous involvement occurs. **Look actively for an epidural abscess**, which is a surgical emergency with any neurological deficit. Get blood cultures and consider **endocarditis**; a CT-guided biopsy is standard if blood cultures are negative.

PROSTHETIC JOINT INFECTION

A different pathway. Requires **multiple deep intraoperative tissue samples**, not swabs. Management depends on timing and implant stability — **debridement with implant retention** for early infection with a stable prosthesis, versus **one- or two-stage revision** for chronic disease. **Rifampin combinations** are used against staphylococcal biofilm, but never as monotherapy.

MONITORING & WHEN IT IS FAILING *what to do at the 2-week review*

Check	Detail
Clinical response	Pain, fever, wound appearance and function should improve within 1–2 weeks . Persistent pain at rest or at night is a warning sign, not expected convalescence.
Inflammatory markers	CRP falls faster than ESR and is the more useful early marker. A plateau or rise after initial improvement should trigger reassessment rather than reassurance.
Drug safety	Weekly labs on prolonged therapy. Linezolid — cytopenias, neuropathy and serotonin syndrome risk beyond 2 weeks. Rifampin — enzyme induction and hepatitis. Vancomycin — levels and renal function. Fluoroquinolones — tendinopathy and QT.
If not improving	Think undrained collection or sequestrum , retained hardware , resistant or unidentified organism, inadequate source control , or poor perfusion in a diabetic or ischemic limb. Re-image and re-culture rather than empirically broadening.
Vascular assessment	In diabetic foot disease, revascularization may matter more than the antibiotic . An ischemic foot will not heal regardless of how good the microbiological cover is.

PEARLS & PITFALLS

- **Get the bone culture before antibiotics** in the stable patient. Starting first commits them to weeks of blind therapy.
- **Sinus tract and wound swabs do not tell you the bone organism.** Treating from a swab is a common and consequential error.
- **A normal plain film means nothing early** — changes lag by 2–3 weeks. Get the MRI.
- **Oral therapy is evidence-based, not a compromise.** OVIVA showed non-inferiority with fewer line complications and shorter admission.
- **S. aureus bacteremia demands an echo** and a search for metastatic foci, including the spine.
- **Dead bone and retained hardware will not sterilize.** If they are not improving, the answer is usually surgical, not a broader antibiotic.

